

EURADOS IC2017n

Irradiations at NPL

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Outline

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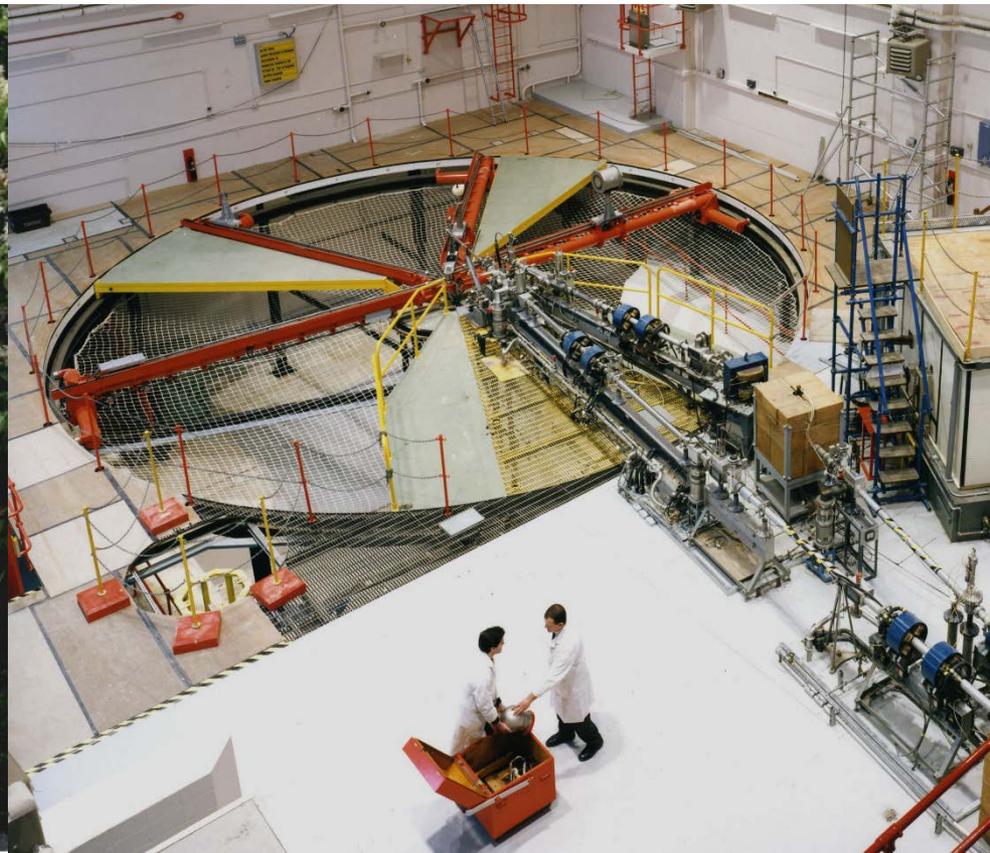
Nuclear Metrology Group Neutron Facility

Chadwick Building

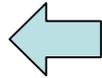
Low Scatter Facility

24mx18mx18m

Source 6 m above the floor and 12 m below the ceiling

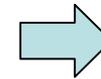


Irradiation Overview



Source emission rates measured in NPL Manganese Bath

Source anisotropy measured in same facility as exposures



Source Type	Angle (degrees)	Dose ($H_p(10)$) (mSv)	Source ID	Emission Rate Aug 1 st 2017 (s^{-1})	Source Anisotropy	Approximate Irradiation Length
$^{241}\text{Am-Be}$	0°	1.5	1999NE	3.1×10^7	1.041	2 h 11 min
^{252}Cf	0°	12	1254NU	8.5×10^7	1.023	6 h 54 min
^{252}Cf	0°	1.5	1254NU	8.5×10^7	1.023	52 min
^{252}Cf	0°	0.3	1254NU	8.5×10^7	1.023	10 min
^{252}Cf	45°	1.5	1254NU	8.5×10^7	1.023	53 min

All irradiations were performed at a distance of 75 cm

Irradiation Set-up

EPDs mounted on top of phantoms during exposures were used to monitor the irradiations



18 dosimeters for each participant

Total of 648 dosimeters were irradiated (9 August – 15 September 2017)

Record-Keeping

Photographs of dosimeters were taken with their respective record sheets to minimise transcription errors, and provide unambiguous evidence of the dosimeter exposures

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GENERAL PERSONAL DOSEMETER IRRADIATIONS - LABORATORY WORKSHEET, Version 5b

DOSIMETRY SERVICE: _____

REFERENCE NO: _____

DATE OF IRRADIATION: _____

ARM & TROLLEY USED: _____
(i.e. arm C, trolley Y)

APPROX Hp(10) RATE USE: _____

DOSEMETER NO.
S010/2017-001
-008
-014
-017

SOURCE Speaking Clock: _____

UP Stopwatch: _____

26/7/17 Source Up: _____

ELAPSED TIME: _____

APPROX TOTAL Hp(10): _____

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DOSIMETRY SERVICE: _____

REFERENCE NO: _____

DATE OF IRRADIATION: _____

ARM & TROLLEY USED: _____
(i.e. arm C, trolley Y)

APPROX Hp(10) RATE USE: _____

DOSEMETER NO.
S010/2017-003
-006
-013
-018

SOURCE Speaking Clock: _____

UP Stopwatch: _____

8/9/17 Source Up: _____

ELAPSED TIME: _____

APPROX TOTAL Hp(10): _____

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DOSIMETRY SERVICE: _____

REFERENCE NO: _____

DATE OF IRRADIATION: _____

ARM & TROLLEY USED: _____
(i.e. arm C, trolley Y)

APPROX Hp(10) RATE USE: _____

DOSEMETER NO.
S010/2017-002
-005
-010
-016

SOURCE Speaking Clock: _____

UP Stopwatch: _____

7/9/17 Source Up: _____

ELAPSED TIME: _____

APPROX TOTAL Hp(10): _____

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DOSIMETRY SERVICE: _____

REFERENCE NO: _____

DATE OF IRRADIATION: _____

ARM & TROLLEY USED: _____
(i.e. arm C, trolley Y)

APPROX Hp(10) RATE USE: _____

DOSEMETER NO.	DISTANCE (To front face of phantom or to back face of dosimeter if F1A)	RADIAL DISPLACEMENT (phi in DEGREE OR DEGREE (PIA))
S010/2017-004		
-007		
-011		
-015		

SOURCE Speaking Clock: _____

UP Stopwatch: _____

1/1/ Source Up: _____

ELAPSED TIME: _____

APPROX TOTAL Hp(10): _____



STAFF INITIALS: _____

Summary of Uncertainties

Uncertainty component	Irradiation				
	²⁴¹ Am-Be 0° 1.5 mSv	²⁵² Cf, 0° 12 mSv	²⁵² Cf 0° 1.5 mSv	²⁵² Cf 0° 0.3 mSv	²⁵² Cf 45° 1.5 mSv
Type B (non-random)					
Reference irradiation distance	± 0.55%	± 0.55%	± 0.55%	± 0.55%	± 0.55%
Source emission rate (MnSO ₄ bath) (includes component for half-life)	± 0.69%	± 0.53%	± 0.53%	± 0.53%	± 0.53%
Source anisotropy correction	± 0.25%	± 0.26%	± 0.26%	± 0.26%	± 0.26%
Timing	± 0.06%	± 0.02%	± 0.15%	± 0.74%	± 0.14%
Scatter	± 2.0%	± 2.0%	± 2.0%	± 2.0%	± 2.0%
H _p (10,θ) conversion coefficient	± 4.0%	± 1.0%	± 1.0%	± 1.0%	± 1.0%
Total Standard Uncertainty Components added in quadrature	± 4.6%	± 2.4%	± 2.4%	± 2.5%	± 2.4%
Expanded uncertainty	± 9.1%	± 4.8%	± 4.8%	± 5.0%	± 4.8%